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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/727,187 | 12/02/2003 | Michael D. Jack | 901.0116.U1 | 4988 |

7590 02/21/2006

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| EXAMINER | |
|---|---|
| POLYZOS, FAYE S | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2884 | |

DATE MAILED: 02/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/727,187 | JACK ET AL. | |
| | Examiner | Art Unit | |
| | Faye Polyzos | 2884 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *02 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/2/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1-6 and 8-9 are rejected under 35 U.S.C. 102(b) as being anticipated by *Rice et al. (Journal paper entitled "High-Tc Superconducting Antenna-coupled Microbolometer on Silicon").*

Regarding claim 1, Rice discloses a radiation sensor comprising: a substrate (page 98, lines 2 of 3rd paragraph); an antenna supported by the substrate (Fig. 1a and page 99, 1st paragraph under the heading "Design"); a thermal detector unit (i.e. microbolometer) spaced from the antenna and from the substrate (Fig. 1b and 3b); a multi-layered conductive lead comprises a superconductive layer in electrical contact with the thermal detector unit and the antenna, and a support layer between the superconductive layer and the substrate (page 99 1st paragraph under the heading "Design").

Regarding claims 2-4, Rice discloses the conductive lead comprises a buffer layer, comprises Yttria stabilized Zirconia, disposed between the support layer and the superconductive layer characterized by a thermal conductivity K<0.1 W/cm-K (page 98 1st paragraph under the heading "Abstract").

Regarding claims 5-6, Rice discloses the buffer layer defines a thermal conductivity that is less than one order of magnitude greater than a thermal conductivity defined by the superconductive layer (page 99 1st paragraph).

Regarding claim 8, Rice discloses a radiation sensor for measuring incident radiation comprising a substrate defining a cavity (page 98, lines 2 of 3rd paragraph); a thermal detector unit (i.e. microbolometer) disposed above the cavity (Fig. 1b and 3b), an antenna coupled to the substrate (Fig. 1a and page 99, 1st paragraph under the heading "Design"); and a conductor in contact with the antenna and the thermal detector unit, the improvement comprising: the conductor defining a plurality of layers and comprising: a superconductor layer; a support layer between the conductive layer and the substrate; and a buffer layer between the support layer and the superconductive layer (Fig. 1b and 3b and page 99 1st paragraph under the heading "Design").

Regarding claim 9, Rice discloses a radiation sensor for measuring incident radiation comprising a substrate defining a cavity (page 98, lines 2 of 3rd paragraph); a thermal detector unit (i.e. microbolometer) disposed above the cavity (Fig. 1b and 3b), an antenna coupled to the substrate (Fig. 1a and page 99, 1st paragraph under the heading "Design"); and a conductor in contact with the antenna and the thermal detector unit, the improvement comprising: the conductor defining a multi-layer structure and comprising: a support layer adjacent to the substrate; a superconductive layer opposite the substrate; and a buffer layer between the support layer and the superconductive layer (Fig. 1b and 3b and page 99 1st paragraph under the heading "Design").

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

*4.* Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Rice et al. (Journal paper entitled "High-Tc Superconducting Antenna-coupled Microbolometer on Silicon")* as applied to claim 1 above, and further in view of *Ooms et al (US 6,563,118 B2).*

Regarding claim 7, Rice discloses a radiation sensor comprising: a substrate (page 98, lines 2 of 3rd paragraph); an antenna supported by the substrate (Fig. 1a and page 99, 1st paragraph under the heading "Design"); a thermal detector unit (i.e. microbolometer) spaced from the antenna and from the substrate (Fig. 1b and 3b) ; a multi-layered conductive lead comprises a superconductive layer in electrical contact with the thermal detector unit and the antenna, and a support layer between the superconductive layer and the substrate (page 99 1st paragraph under the heading "Design"). Rice does not disclose of the superconductive layer selected from a group of perovskite superconductors. Ooms discloses semiconductive layer consisting of perovskite superconductors (col. 1, lines 14-21). Ooms teaches various metallic oxides, such as perovskites, exhibit desirable characteristics such as piezoelectric, pyroelectric, ferroelectric, ferromagnetic, colossal magnetic resistance and super conductive properties. Such oxides may be included or used in connection with microelectronic

devices that take advantage of these characteristics (col. 1, lines 14-21). Therefore, it would have been obvious to modify the radiation sensor disclosed by Rice, to include a semiconductor layer consisting of perovskite superconductors, as disclosed supra by Ooms, to allow for a more versatile apparatus.

5. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Rice et al. (Journal paper entitled "High-Tc Superconducting Antenna-coupled Microbolometer on Silicon")* and Luukanen *et al (US 2003/0222217 A).*

Regarding claim 10, Rice discloses of a method for making a radiation sensor comprising: a substrate (page 98, lines 2 of 3rd paragraph); an antenna supported by the substrate (Fig. 1a and page 99, 1st paragraph under the heading "Design"); a thermal detector unit (i.e. microbolometer) spaced from the antenna and from the substrate (Fig. 1b and 3b); a multi-layered conductive lead comprises a superconductive layer in electrical contact with the thermal detector unit and the antenna, and a support layer between the superconductive layer and the substrate (page 99 1st paragraph under the heading "Design"). Rice does not specifically disclose of a method to deposit the filler material within the cavity. Luukanen discloses depositing a filler material within the cavity of the substrate (301); depositing a thermal detector unit (i.e. microbolometer) onto the filler material; depositing an antenna (102, 103) onto the substrate (301); depositing a multi-layer conductive lead to contact the thermal detector unit and the antenna, wherein the multi-layer conductive lead defines a layer of superconductive material; and conductively bonding a first segment of the conductive lead to the antenna to form an electrically conductive pathway between the

superconductive material and the antenna, and a second segment of the conductive lead to the thermal detector unit so as to form an electrically conductive pathway between the superconductive layer and the thermal detector unit (paragraphs [0033]-[0034]). Luukanen teaches after patterning, a layer of low-$T_c$ superconductive material is deposited onto the patterned surface and excess resist and the unwanted remnants of the material are washed away in a solvent, leaving only the required patterns on top of the surface of the sacrificial layer (paragraph [0033]). Therefore, it would have been obvious to modify the method suggested by Rice, to incorporate a depositing of filler material method, as disclosed supra by Luukanen, to allow for a more versatile radiation sensor.

Regarding claim 11, Luukanen discloses the method comprising a removing the filler material (paragraph [0033]).

Regarding claim 12, Luukanen discloses depositing a thermal detector unit comprises depositing a thermally reactive material over at least a portion of the filler material and delineating edges thereof to define the thermal detector unit (See Abstract and paragraph [0033]).

Regarding claim 13, Luukanen discloses depositing an antenna (102)(103) onto the substrate (301) comprises depositing a conductive material onto the substrate and delineating edges thereof to define the antenna (See Abstract and paragraphs [0006] and [0033]).

6. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Rice et al. (Journal paper entitled "High-Tc Superconducting Antenna-coupled*

*Microbolometer on Silicon") and* Luukanen *et al (US 2003/0222217 A)* as applied to claim 10 above, and further in view of *Ooms et al (US 6,563,118 B2).*

Regarding claim 14, Rice discloses the method wherein depositing a multi-layer conductive lead comprises; depositing a layer of support material to contact the thermal detector unit and the antenna; depositing a layer of buffer material over at least a portion of the support material; depositing a layer of superconductive material over at least a portion of the buffer material (Fig. 1b and 3b and page 99 1st paragraph under the heading "Design"). Luukanen discloses depositing a filler material within the cavity of the substrate (301); depositing a thermal detector unit (i.e. microbolometer) onto the filler material; depositing an antenna (102, 103) onto the substrate (301); depositing a multi-layer conductive lead to contact the thermal detector unit and the antenna, wherein the multi-layer conductive lead defines a layer of superconductive material; and conductively bonding a first segment of the conductive lead to the antenna to form an electrically conductive pathway between the superconductive material and the antenna, and a second segment of the conductive lead to the thermal detector unit so as to form an electrically conductive pathway between the superconductive layer and the thermal detector unit (paragraphs [0033]-[0034]). Neither Rice nor Luukanen disclose delineating at least one conductive lead. Ooms discloses delineating at least one conductive lead by removing at least one of excess support material, excess buffer material, and excess superconductive material (col. 9, lines 21-28). Ooms teaches to reduce the thermal capacity and thermal conduction into the substrate a portion of the substrate is preferably removed the proximate pyroelectric element. The portion of the

substrate is removed using an etch which selectively etches material of the substrate relative to material comprising layer, layer may serve as an etch stop (col. 9, lines 21-28). Therefore, it would have been obvious to modify the method of making a radiation sensor disclosed by Rice and Luukanen, to include a delineating method, as suggested supra by Ooms, to allow for a more versatile method of making a radiation sensor.

Regarding claim 15, Ooms discloses the method wherein depositing a layer of buffer material includes laser depositing with ion beam assist (col. 6, lines 20-41).

Regarding claim 16, Rice discloses a method for making an array of radiation sensors, wherein defining a cavity within a substrate comprises defining a plurality of cavities within a substrate; depositing a thermal detector unit onto the filter material comprises depositing at least one thermal detector unit onto the filter material within each cavity; depositing an antenna onto the substrate comprises depositing at least one antenna onto the substrate for each cavity; depositing a multi-layer conductive lead to contact the thermal detector unit and the antenna comprises depositing a plurality of conductive leads, each conductive lead contracting one thermal detector unit and one antenna; and conductively bonding comprises bonding the first and second segment of each conductive lead to one of an antenna and a thermal detector unit (Fig. 1b and 3b and page 98, lines 2 of 3$^{rd}$ paragraph and page 99 1$^{st}$ paragraph under the heading "Design"). Rice does not disclose depositing a filter material within the cavity. Luukanen discloses method of depositing a filler material within the cavity comprises depositing filter material within the plurality of cavities (paragraphs [0033]-[0034]). Luukanen teaches after patterning, a layer of low-$T_c$ superconductive material is

deposited onto the patterned surface and excess resist and the unwanted remnants of the material are washed away in a solvent, leaving only the required patterns on top of the surface of the sacrificial layer (paragraph [0033]). Therefore, it would have been obvious to modify the method suggested by Rice, to incorporate a method of depositing filler material within the cavity, as disclosed supra by Luukanen, to allow for a more versatile method of making a radiation sensor.

***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

OTILIA GABOR
PRIMARY EXAMINER

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP